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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,843	06/27/2003	Taekeun Lee	CPAC 1014-4	7642

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EXAMINER
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NGUYEN, KHIEM D

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/608,843

Applicant(s)

TAEKEUN LEE

Examiner

Khiem D Nguyen

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 091103.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (U.S. Patent 6,400,014).

In re claim 1, **Huang** discloses a method for manufacturing a plastic ball grid array package, comprising placing a heat spreader (**FIG. 1: 33**) having an upper portion (**FIG. 1: 330a**) and a plurality of support arms (**FIG. 1: 331**) into a mold cavity, placing over the mold cavity a ball grid array including a semiconductor die (**FIG. 1: 31**) mounted on a support surface of a substrate (**FIG. 1: 30**) and connected to the substrate, such that lower ends of the support arms contact the support surface (**FIG. 1: 300**) of the substrate peripheral to the die; injecting molding material (**FIG. 1: 34**) into the cavity to form the molding cap; and permitting the molding material to harden to form a mold cap (col. 3, line 53 to col. 4, line 40 and **FIGS. 1-7**).

2. Claim 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (U.S. Patent 6,400,014).

In re claim 10, **Huang** discloses a method for manufacturing a plastic ball grid array package, comprising placing a heat spreader (**FIG. 1: 33**) having an upper portion

(FIG. 1: 330a) and a plurality of support arms (FIG. 1: 331) onto the die support surface (FIG. 1: 300) of the substrate (FIG. 1: 30) such that at least one of the supporting arms of the heat spreader is affixed to the substrate using a resilient fixative such as an elastomeric adhesive; placing a mold cavity over the heat spreader; injecting the molding material (FIG. 1: 34) into the cavity; and permitting the molding material to harden to form a mold cap (col. 3, line 53 to col. 4, line 40 and FIGS. 1-7).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2-9 and 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (U.S. Patent 6,400,014) in view of Brestel (U.S. Patent 5,328,811).

In re claims 2, 3, 6, 11, 12, and 15, Huang discloses wherein the heat spreader (FIG. 1: 33) is made of metal (col. 4, lines 13 to 40) but does not explicitly disclose treating an undersurface of the metal heat spreader to form a black copper oxide layer prior to injecting the molding material.

Brestel discloses treating an undersurface of the copper layer 3 with a base solution of NaClO<sub>2</sub> to form a black copper oxide layer. It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Huang and Brestel to enable the black copper oxide layer of Huang to be formed and

furthermore a blackened copper oxide layer exhibits high absorption of infrared radiation (col. 5, lines 3-18 and **FIGS. 1-7**).

In re claims 4 and 13, **Brestel** discloses wherein the black copper oxide layer having a thickness in the range 10  $\mu\text{m}$  up to some tens of  $\mu\text{m}$  (col. 5, lines 16-18).

In re claims 5, 8, 9, 14, 17, and 18, neither **Huang** nor **Brestel** disclose a black copper oxide layer having a thickness of 7  $\mu\text{m}$  and wherein the treating comprises micro-etching the copper undersurface of the heat spreader to a roughness in the range 0.5  $\mu\text{m}$  to 1.0  $\mu\text{m}$ . However, there is no evidence indicating the thickness and the roughness range of the black copper oxide layer is critical and it has been held that it is not inventive to discover the optimum or workable thickness of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

In re claims 7 and 16, **Brestel** discloses wherein the treating comprises micro-etching the copper undersurface of the copper layer (col. 5, lines 3-45 and **FIGS. 1-7**).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.  
June 12, 2004

W. DAVID COLEMAN  
PRIMARY EXAMINER



W. DAVID COLEMAN  
PRIMARY EXAMINER